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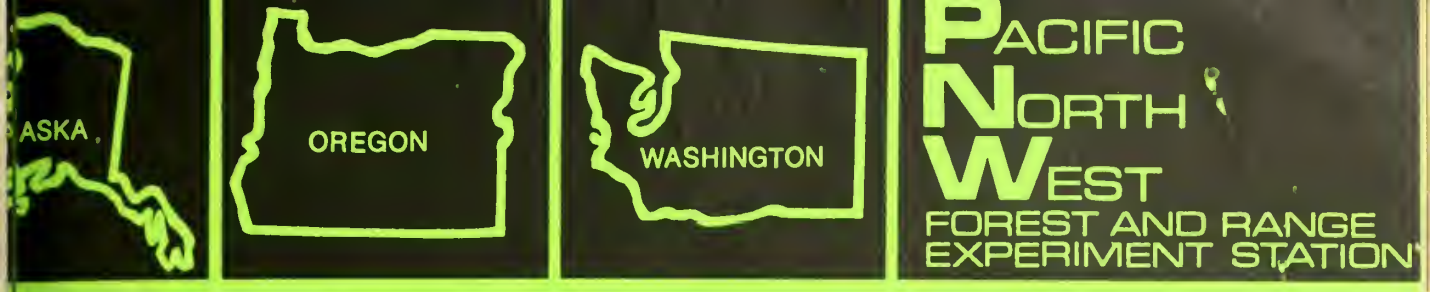

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EVALUATING DAMAGE CAUSED TO A CAMPGROUND BY DOUGLAS-FIR TUSSOCK MOTH

by

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ABSTRACT

The impact of insect defoliation on recreation values can be an important factor in an economic analysis of overall damage. Tree mortality and top-kill were tallied and evaluated on a small campground in 1970. Cleanup costs involving hazardous trees and dead tops amounted to $23.75 per camp unit. When esthetic values were assigned to trees, the insect damage costs increased to $126.88 per camp unit. Campground trees should be assigned some replacement value rather than their timber value to aid the pest management specialist in determining the level and kind of suppression technique to be applied against a given pest.

KEYWORDS: Economic evaluation, insect damage control (forest), recreation.

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INTRODUCTION

The Douglas-fir tussock moth (*Orgyia pseudotsugata* McD.) can cause heavy defoliation of white fir (*Abies concolor* (Gord. and Glend.) Lindl.), and this may result in large amounts of tree mortality and top-kill (Wickman 1963). In 1964-65, this insect caused severe damage on 450 acres (182 ha) surrounding a U.S. Forest Service campground at Stowe Reservoir in the Warner Mountains, Modoc National Forest (Wert and Wickman 1970). The impact of insect defoliation on recreation values can be an important factor to include in overall estimates of damage. This infestation offered a unique opportunity to evaluate damage to trees on a recreation site after a Douglas-fir tussock moth infestation. Consequently, a survey on the impact on the Stowe Reservoir campground was made in cooperation with the Warner Mountain District of the U.S. Forest Service in the summer of 1970.

FEATURES OF THE CAMPGROUND

The campground is situated in a small basin at about 6,000-foot (1,829-m) elevation. It is composed of eight camp units (table and fireplace) scattered over 3 acres (1 ha). The campground also has piped spring water, four pit toilets, and roads leading to each unit. The estimated replacement value was $1,500 per unit or $12,000 for the entire campground in 1970. In addition, $650 per year was spent on maintenance and cleanup (1970 costs). Visitor use steadily increased from 1965 to 1970; recreation visits in 1970 totaled an estimated 1,000 visitor days. The majority of the visits were for overnight camping.

Esthetic features are difficult to quantify. The campground is surrounded by a 60- to 70-year-old stand of white fir with some scattered Washoe pine (*Pinus washoensis* Mason & Stockwell), ponderosa pine (*Pinus ponderosa* Laws.), and western juniper (*Juniperus occidentalis* Hook.). When the basin was first logged, about 75 years ago, the trees in the campground area were not cut. Consequently, there are 48 white fir trees over 20-inch (51-cm) d.b.h. in the campground. The vistas from campsites vary from forested hillside, a small pond (the reservoir) which is silting into a verdant meadow, and craggy Bear Mountain immediately to the north. The campground is not close to developed summer recreation facilities; but outdoor activities available nearby include hiking, looking for petrified wood, and deer hunting. These activities, plus the beautiful mountain scenery and availability for overnight use, account for the increased use of the campground.

THE TUSSOCK MOTH OUTBREAK AND TREE DAMAGE

In 1964, larvae of the Douglas-fir tussock moth were first detected on white fir in the campground as a result of complaints from campers. Larvae and their fecal pellets fell on picnic tables, cars, and tents, causing considerable annoyance. There were also reports that the garbage collectors suffered skin irritation from contacting the poisonous hairs of the caterpillar. Because of the insects' nuisance and ability to damage trees, the Stowe Reservoir campground and 200 acres (81 ha) of infestation surrounding the campground were sprayed with Malathion on August 2. The insecticide failed to control larval populations or prevent damage. By late summer 1964, 450 acres (182 ha) surrounding the campground were severely defoliated and trees were dying (fig. 1). An infested area of 2,098 acres (849 ha) was treated with DDT on June 29 and July 4, 1965. The population was decimated within

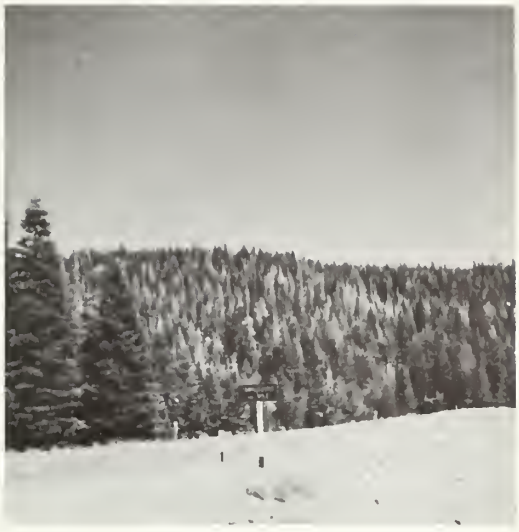

Figure 1.--White fir mortality in the Stowe Reservoir area after the 1964-65 outbreak of Douglas-fir tussock moth.

10 days due to the insecticide and a natural virus. There was no further feeding damage, but thousands of heavily defoliated trees in the basin subsequently died or suffered top-kill (Wert and Wickman 1970).

Three types of damage occurred in the campground: tree mortality (fig. 2), top-kill (fig. 3), and thin foliage which indicated a weakened condition and possible top-kill or death.

Figure 2.--White fir mortality after heavy defoliation by the Douglas-fir tussock moth (Stowe Reservoir, 1967).

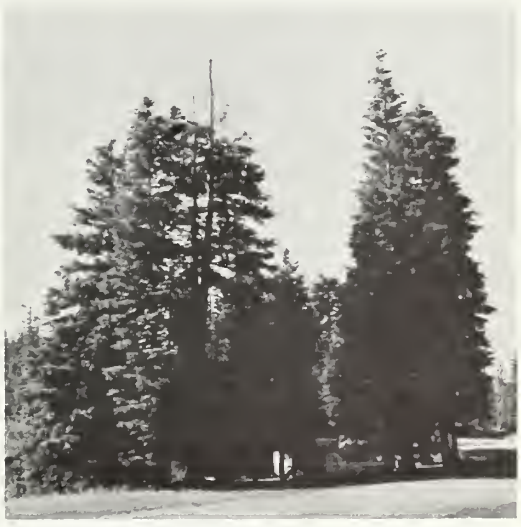

Figure 3.--White fir top-killed by Douglas-fir tussock moth defoliation. Trees are directly over a campsite (Stowe Reservoir, 1970).

Before the infestation, there were 22 pine and 348 white fir trees in the campground, 6- to 32-inch (15- to 81-cm) d.b.h. (there was little regeneration because of human and vehicular traffic). By 1970, 7 percent of the fir trees had been killed outright, and another 5 percent were top-killed or had thin crowns (table 1). The merchantable dead trees were not salvaged for milling because of their low saw-log value and the desire to disturb the campground as little as possible.

TABLE 1.--*Number and percent of all white fir trees by diameter class and damage class, Stowe Reservoir campground, Modoc National Forest, July 1970*

D.b.h. class (inches)	Undamaged		Killed		Top-killed		Thin foliage		Total damage	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
6-9	162	95.9	6	3.6	0	0	1	0.5	7	4.1
10-19	105	81.4	17	13.2	4	3.1	3	2.3	24	18.6
>20	40	80.0	2	4.0	8	16.0	0	0	10	20.0
Total number and weighted average percent	307	88.2	25	7.2	12	3.4	4	1.2	41	11.8

EVALUATION OF DAMAGE ATTRIBUTED TO THE TUSSOCK MOTH INFESTATION

It is extremely difficult to evaluate the economic damage that insects, or any other agent, may inflict on forest trees in recreation sites. Such trees have a value at least equal to their saw-log value, but this does not take into account the value of the tree in situ or its contribution to the esthetics of the site. Therefore, two analyses are presented here--one on actual costs, the other on unit value per tree per camp. They are strictly examples because there are no precise standards for evaluating tree esthetics on wildland recreation areas.

1. *Values based on actual costs.* Dead trees and tops from top-killed trees often should be removed from Forest Service recreation sites because they are hazardous (Paine 1971). The costs of tree removal in 1970 were:

Tree felling and slash disposal of dead trees	$ 90
Topping of top-killed trees	100
Total	$190

Removal of damaged trees amounted to $23.75 per camp unit.

2. *Values based on a calculated unit value per tree per camp.*[2/] The estimated replacement value per camp unit at Stowe Reservoir was $1,500 in 1970. There were 348 white fir and 22 pine trees in the campground before

[2/] Analysis suggested by Lee Paine, Pathologist, Pacific Southwest Forest and Range Experiment Station, Berkeley, Calif.

the infestation. If we divide number of trees per unit into the capital investment per unit we obtain a value per tree that relates to its in situ esthetic value (if we assume that the unit would have some lesser value without the trees).

Total trees	Camp units	Trees per unit	Esthetic value per tree ($1,500÷46)	Trees killed	Value lost in dead trees
370	8	46	$33	25	$825

Esthetic value lost in dead trees	$ 825
Felling, removal, and topping of trees	190
	$1,015

Costs from insect damage were $126.88 per camp unit by this analysis.

DISCUSSION

Timber losses caused by insects are usually figured in board- or cubic-foot volume and relate to wood fiber made unavailable for manufacturing. The impact of insects feeding on trees in recreation sites needs to be evaluated in a totally different light. Most of the trees in this campground have been growing for 50 to 200 years. They are needed for shade, screening, and their esthetic qualities. Obviously, each tree has a unique and high value much greater than its saw-log value.

When the potential damage that may be caused by an insect infestation in a recreation site is considered, the anticipated costs of removal of hazardous trees should be augmented by replacement costs of camp units. For future cost-benefit analysis in forest management models, it would be helpful if landscape architects or recreation foresters would consider campground trees as part of the total investment and make some effort to assign replacement values to them as they do tables, stoves, and toilets. This would aid the pest management specialist in determining the level and kind of suppression technique to be applied against a given pest to protect those values.

LITERATURE CITED

Paine, L. A.
1971. Accident hazard. Evaluation and control decisions on forested recreation sites. USDA For. Serv. Res. Pap. PSW-68, 11 p., illus. Pac. Southwest For. and Range Exp. Stn., Berkeley, Calif.

Wert, Steven L., and Boyd E. Wickman
1970. Impact of Douglas-fir tussock moth. . . color aerial photography evaluates mortality. USDA For. Serv. Res. Pap. PSW-60, 6 p., illus. Pac. Southwest For. and Range Exp. Stn., Berkeley, Calif.

Wickman, Boyd E.
1963. Mortality and growth reduction of white fir following defoliation by the Douglas-fir tussock moth. USDA For. Serv. Res. Pap. PSW-7, 15 p., illus. Pac. Southwest For. and Range Exp. Stn., Berkeley, Calif.

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